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Inframalleolar Arterial Bypass in Patients with Pedal Gangrene for Limb Salvage

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Objectives: The objective of this study was to evaluate our experience with inframalleolar arterial bypass for ischemic limb salvage.

Methods: This study was a retrospective chart review. Out of 1100 lower extremity revascularizations, we identified 55 patients with inframalleolar bypass performed from 2001 to 2013. Nine patients with rest pain and traumatic bypasses were excluded. Forty-six patients with ischemic tissue loss were included in the study. Patients and graft characteristics and the outcome evaluated.

Results: The average follow-up period was 38 months (range, 2-130 months). Dorsalis pedis artery was the most commonly used distal target (59%), followed by plantar artery (24%). Reverse greater saphenous vein was the most predominantly used conduit (61%) followed by composite graft (20%). Amputation-free survival rate was 74%, 65%, and 59% at 1, 3, and 5-year follow-up, respectively. Limb salvage rate was 80%, 76%, and 72% at 1, 3, and 5-year follow-up, respectively. Overall patency rate was 69.5% at 5 years. Thirteen patients (28.3%) underwent major amputations. At the end of the study, 31% of patient with amputations vs 73% of patients with limb salvage were alive. Patients with congestive heart failure had worse outcome (50% had major amputations in first 6 months; $P = .027$). Survival was inferior in patients with end stage renal disease but did not reach statistical significance.

Conclusions: Inframalleolar bypass for ischemic tissue loss can result in a satisfactory short-term as well as long-term results. Patients with congestive heart failure or end-stage renal disease have poorer prognosis.

Physiologic Variations in Arterial and Venous Hemodynamics During Upper Extremity Postural Changes in the Normal Population

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Objectives: Hemodynamic variation in venous and arterial flow across the thoracic outlet (TO) during postural changes occurs in normal individuals. The aim of this study was to establish the prevalence of arterial and venous hemodynamic variation in normal volunteers during standardized upper extremity positional changes.

Methods: Using Doppler ultrasound and photoplethysmography (PPG) we evaluated arterial and venous flow in 100 limbs of 50 normal volunteers in neutral position and in five standardized arm positions, including 90-degree arm abduction (head in neutral position, head turned ipsilaterally, and head turned contralaterally), arm extended above head 180 degrees, and arm hyperextended at 200 degrees.

Results: There was great variability in the prevalence of abnormal venous and arterial flow depending on arm position. Venous flow anomalies (loss of flow phasicity resulting in continuous, minimally continuous, or absent flow) were demonstrated in 60% of limbs. The maneuver producing the greatest prevalence of venous abnormality was 90-degree arm abduction with ipsilateral head turn (32% of limbs), while hyperextension produced the least venous flow abnormalities (25% of limbs). Arterial flow abnormalities were found in 13% of the limbs by PPG testing (absent tracings in 8% and dampened waveform in 5%), and 22% of limbs showed increased arterial velocities (positional to neutral velocity ratio >2.0). The arm position producing the greatest prevalence of arterial flow anomaly was hyperextension (21% of limbs); while arm positioning with 90-degree abduction with head in neutral resulted in no arterial flow abnormalities.

Conclusions: The prevalence of upper extremity vascular hemodynamic changes varies in different arm positions. Our data suggest that physiologic anomalies in venous flow across the TO during postural changes are very common, while the absence of finger PPG arterial tracings occur in a very small percentage of the population. Abnormal venous flow across the TO with postural changes should be considered a highly prevalent finding in the normal population, and therefore carries no diagnostic value. On the other hand, severe arterial flow restriction to the fingers by PPG testing occurs in a small percentage of the normal population and may represent an anomaly.

Endovascular Interventions on the Below Knee Popliteal Artery: Four-Year Results

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Objectives: Endovascular interventions are increasingly being used as treatment for more distal lesions. Our goal was to evaluate predictors for successful interventions for the lesions involving the segment of the popliteal artery below the knee.

Methods: We performed a retrospective analysis of a prospectively maintained database from 2004 to 2012 for all patients that had endovascular interventions of the popliteal artery lesions below the knee. We recorded patients' demographics, previous interventions, comorbidities, TASC classification, angiographic findings, type of intervention, and other associated interventions. Outcomes included primary and secondary restenosis, limb loss, and mortality.

Results: We identified 221 patients meeting criteria. The average age was 73, and 56% were male. Indications were claudication in 17% and critical limb ischemia (CLI) in 83%. The average lesion length was 10 cm, with 45% having a complete occlusion. Freedom from restenosis was 57% at 4 years with CLI (hazard ratio [HR], 4.4; 95% confidence interval [CI], 1.9-9.9), patients who had angioplasty (PTA), atherectomy, and stent combination therapy (HR, 2.7; 95% CI, 1.01-7.4) as independent predictors. Atherectomy with PTA has significantly less restenosis in diabetics compared with nondiabetics ($P < .05$). Secondary patency was 72% at 4 years. Limb salvage was 82% with secondary restenosis (HR, 3.3; 95% CI, 1.5-7.5), diabetes (HR, 10.6; 95% CI, 1.4-83), and tissue loss (HR, 4.0; 95% CI, 1.2-13.5) as predictive. Survival was 75% at 5 years with chronic renal insufficiency (HR, 2.5; 95% CI, 1.2-5.2), tissue loss (HR, 2.8; 95% CI, 1.4-5.7), dialysis (HR, 3.1; 95% CI, 1.4-6.8), and chronic obstructive pulmonary disease (HR, 2.0; 95% CI, 1.0-4.1) predictive of long term mortality. Statin use was protective against primary restenosis (HR, 0.39; 95% CI, 0.23-0.67) and mortality (HR, 0.5; 95% CI, 0.28-1.0).

Conclusions: Endovascular interventions for lesions involving the below knee popliteal artery have good primary and secondary patency in our population of mostly CLI patients. Diabetics seem to benefit more from angioplasty combined with atherectomy. Statin use is protective against restenosis and mortality and should be a standard adjunct in all patients undergoing peripheral endovascular interventions.

Our Two-Year Experience with Endovascular Repair of Abdominal and Iliac Aneurysm with Preservation of Pelvic Flow

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Objectives: The 2-year results of using an alternative endovascular approach for the repair of common iliac aneurysms is presented. For this, we assembled a bifurcated covered stent graft limb that allows for exclusion of common iliac aneurysm while maintaining pelvic flow. This configuration of grafts is capable of debranching virtually any anatomy and preserving pelvic flow while allowing the physician the freedom to stage the procedure if patient status declines.

Methods: The newly assembled bifurcated limb would divide common iliac flow into the internal and external liliac arteries while excluding the common iliac artery aneurysm. This graft would be constructed from a standard sized stent graft limb that would extend from a main body graft. The bifurcated stent graft limb was assembled from a standard 16 × 20 × 82 stent graft limb. The 20-mm end was joined to a 10-mm and an 8-mm by 3-cm-long covered stent. The 10-mm stent was dedicated to the external iliac while the 8-mm stent was dedicated to the internal iliac. Once the graft was re-sheathed via spiral wire technique, a traditional infrarenal AAA repair was performed. In order to exclude the common iliac aneurysm, the bifurcated stent graft limb was orientated and deployed 2 to 3 cm proximal to the origin of the internal iliac aneurysm. From an arm approach and through the 8-mm limb of the bifurcated stent